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PATENT

8075-1055-1

IN THE U.S. PATENT AND TRADEMARK OFFICE

In re application of	Appeal No.
Tadahiro OHMI et al.	Conf. 1521
Application No. 10/646,855	Group 1794
Filed August 21, 2003	Examiner John J. ZIMMERMAN

METAL MATERIAL HAVING FORMED THEREON CHROMIUM OXIDE,
PASSIVE FILM AND METHOD FOR PRODUCING THE SAME, AND PARTS
CONTACTING WITH FLUID AND SYSTEM FOR SUPPLYING FLUID AND
EXHAUSTING GAS

APPEAL BRIEF

MAY IT PLEASE YOUR HONORS:

(i) Real Party in Interest

The real party in interest in this appeal is the assignees, Tadahiro OHMI of Miyagi-ken, Japan and FUJIKIN INC. of Osaka Japan.

(ii) Related Appeals and Interferences

Neither the appellant, appellant's legal representative nor the assignee know of any other prior or pending appeals, interferences or judicial proceedings which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(iii) Status of Claims

Claims 3 and 5-7 are pending, from whose final rejection this appeal is taken.

Claims 1, 2 and 4 were cancelled.

(iv) Status of Amendments

The claims were amended in the Amendment filed November 3, 2009 prior to the final rejection of the Official Action of December 7, 2009 ("Official Action"). These claims are set forth in the Claims Appendix.

(v) Summary of the Claimed Subject Matter

In general terms, the claims are directed to a method for manufacturing metallic material having a chromium-oxide passivation film formed thereon. There are two independent claims 3 and 7, as explained in detail below:

Independent claim 3 is directed to a method for manufacturing metallic material having a chromium-oxide passivation film formed thereon, comprising the steps of:

depositing a coating material consisting of chromium by a wet plating method onto a metallic material with a surface roughness (Ra) of not more than 1.5 μ m, said coating material having a thickness of at least 100 nm;

(See, e.g., Specification page 2, lines 1-7 in view of the plating method described on page 8, lines 13 and 14, and the thickness illustrated in Figure 2, i.e., at least 100 nm.)

baking said chromium-coated metallic material formed by the wet plating method at a temperature of 100 °C to 200°C in a high-purity inert gas atmosphere; and

(Specification page 8, lines 10-13.)

applying a heat treatment to said chromium-coated metallic material in an oxidizing atmosphere so as to form a chromium-oxide passivation film on said metallic material, said film having a depth and an outermost surface, and said film providing resistance to highly degradable and corrosive gases.

(Specification page 8, line 13 in view of the results from the heat treatment in an oxidizing atmosphere described on page 6 lines 3-16.)

Independent claim 7 is directed to a method for manufacturing metallic material having a chromium-oxide passivation film formed thereon, comprising the steps of:

depositing a coating material consisting of chromium by a wet plating method onto a metallic material with a surface roughness (Ra) of not more than 1.5µm to form a chromium coat film having an outermost surface and a depth comprising a distance of 100 nm from said outermost surface;

(See, e.g., Specification page 2, lines 1-7 in view of the plating method described on page 8, lines 13 and 14, and the thickness illustrated in Figure 2, i.e., at least 100 nm.)

baking said chromium coat film formed on said metallic material at a temperature of 100°C to 200°C in a high-purity inert gas atmosphere; and

(Specification page 8, lines 10-13.)

applying a heat treatment to said chromium coat film formed on said metallic material in an oxidizing atmosphere so that a chromium-oxide passivation film from said outermost surface of said chromium coat film to a distance in said depth, said chromium-oxide passivation film providing resistance to highly degradable and corrosive gases wherein,

(Specification page 8, line 13 in view of the results from the heat treatment in an oxidizing atmosphere described on page 6 lines 3-16, and the results demonstrated in Figure 2, e.g., as explained on page 9, lines 5-10.)

said chromium-oxide passivation film consists of an element concentration of oxygen and an element concentration of chromium,

(The results demonstrated in Figure 2 show a film consisting of oxygen and chromium in that the percentages of each equal 100.)

said element concentration of oxygen is greater than said element concentration of chromium from said outermost surface to a distance of approximately 30nm in said depth, and

(The results demonstrated in Figure 2 show that the concentration of oxygen is greater than chromium between the outer surface and a distance approximately 30 nm.)

said element concentration of oxygen is less than said element concentration of chromium at a distance of 100 nm in said depth.

(The results demonstrated in Figure 2 show that the concentration of oxygen is less than chromium a distance of 100 nm in the depth.)

(vi) Grounds of Rejection to be Reviewed on Appeal

a. Whether claims 3, 5 and 6 were properly rejected under 35 U.S.C. §112, first paragraph, for not complying with the written description requirement.

b. Whether claims 3 and 5-7 were properly rejected under 35 U.S.C. §103(a) as being unpatentable over WILKINSON U.S. 3,480,483 ("WILKINSON") in view of OHMI EP 0725160A1 ("OHMI").

(vii) **Arguments**

a. Claims 3, 5 and 6 comply with the written description requirement.

The Examiner's position was that a thickness of the coating material of at least 100nm was not suggested by the originally filed application, as recited in independent claim 3.

However, the originally filed application describes Figure 2 in the following manner:

- At page 4, lines 24-26:

Fig. 2 is a view showing a result of evaluating chromium-oxide passivation film after oxidizing treatment by photoelectron spectroscopy;

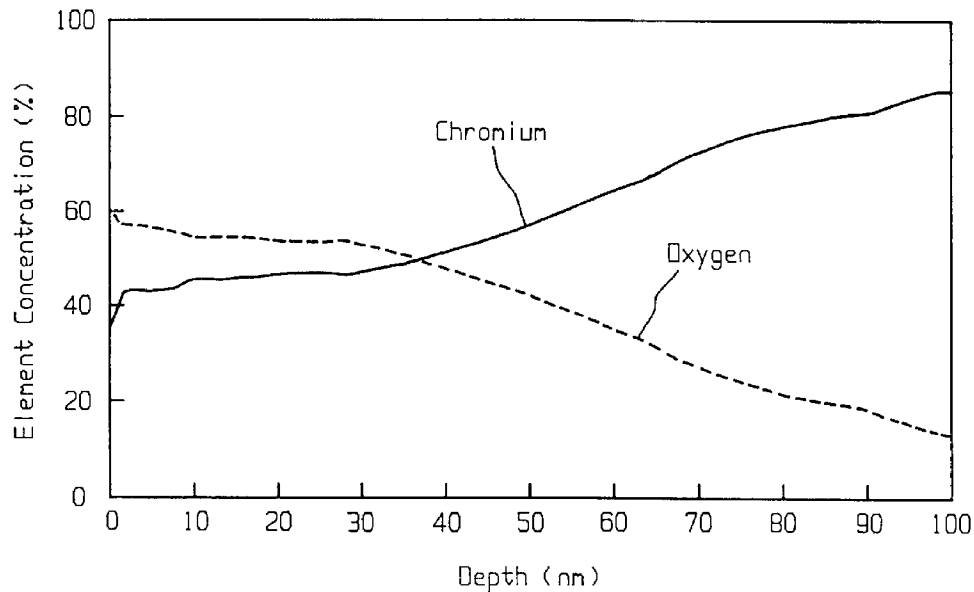
- At page 9, lines 5-10:

Fig. 2 shows a result measured by evaluating chromium-oxide passivation film by a ESCA-100, made by Shimazu Seisakusyo, after oxidizing treatment.

From the results, it was verified that the chromium-oxide passivation film of substantially 100% has been formed, which is approximately 30 nm from the outermost surface.

Thus, based on these descriptions, it is apparent that Figure 2 shows the results of the chromium-oxide passivation film, i.e., the chromium coat film which has been oxidized. There is no suggestion of any other material, e.g., the metallic material upon which the film is coupled.

Figure 2 shows the following:



As can be seen from the above figure, the thickness of the chromium-oxide passivation film is at least 100nm.

If Figure 2 had included the presence of the metallic material, one would have expected to see the presence of the metallic material, for example, iron, by the photoelectron spectroscopy measurement.

Moreover, there is an interface between the coating material (the chromium-oxide passivation film) and the metallic material, which results from the wet plating of the chromium onto the metallic material. See, e.g., claim 3 and page 4, lines 3-11. Thus, one would have expected to see a change in at least the chromium concentration curve at the interface between the coating material and the metallic material surface.

Therefore, it is believed to be apparent that the rejection of independent claim 3, and dependent claims 5 and 6,

is improper and should be reversed. Such action is accordingly respectfully requested.

**b. Claims 3 and 5-7 are not
unpatentable over WILKINSON in view of OHMI.**

WILKINSON discloses coating (including by wet-plating) a thin layer of chromium on the cutting edge of razor blades, and oxidizing by heat treatment at 400°C.

OHMI was offered for teaching baking in order to remove any adhering moisture, and heat treatment in an inert gas atmosphere.

The Examiner concluded that it would have been obvious to use the baking step of OHMI after the coating step of WILKINSON in order to remove any adhering moisture from the blades.

A number of the claims argued separately, per the subheadings that follow.

1. Claims 3, 5 and 6

WILKINSON is directed to treating the cutting edges of stainless steel razor blades by:

- coating (e.g., via electroplating) a thin layer of chromium of less than 400 Angstrom (40 nm), and
- oxidizing by heat treatment at 400°C in a controlled atmosphere with oxygen.

(See, e.g., Abstract, Column 2, lines 3-21.)

Alternatively, WILKINSON offers coating the surface with chromium oxide "thereby eliminating the oxidising step". See, e.g., Column 1, lines 39-45.

WILKINSON fails to disclose or suggest at least three features of independent claim 3, and OHMI is unable to remedy these three shortcomings of WILKINSON for reference purposes for the reasons that follow:

i. Surface roughness of not more than 1.5µm

As disclosed at page 6, lines 3-11 of the specification, the contact ability of an interface between the metallic material and a coat film is improved by coating chromium onto the metallic material of which the surface roughness (Ra) is not more than 1.5µm, as recited in claim 3.

The Examiner's position was that (1) it would have been obvious to minimize the surface roughness, as WILKINSON discloses razor blades, and (2) it would have been obvious to provide a smooth clean surface for the chromium plating layer in order to increase adhesion of the plating (as WILKINSON is concerned with improving adhesion).

However, WILKINSON does not suggest modifying the surface roughness to improve adhesion of the chromium layer.

Instead, WILKINSON solely discloses treatment after applying the chromium layer to improve adhesion of the layer. For

example, WILKINSON discloses annealing after applying the chromium layer, but before heat treatment to improve adhesion (Column 1, lines 50-51). WILKINSON also discloses coating polytetrafluoroethylene onto the blades after the heat treatment, wherein the adhesion between the chromium and blade may be increased by the heating of this polytetrafluoroethylene coating (Column 1, lines 60-63).

OHMI is unable to remedy this shortcoming WILKINSON for reference purposes, as OHMI does not apply a chromium coat layer. Instead, OHMI forms a passivation film on a stainless steel surface by electrolytic polishing and baking. While OHMI does disclose a preferred surface roughness, this is after electrolytic polishing, and the purpose is not for adhesion of an applied chromium coating layer (Column 3, lines 20-25).

Thus, the proposed combination fails to disclose or suggest a surface roughness of the metallic material of not more than 1.5 μ m as recited in claim 3.

ii. Coating thickness of at least 100 nm.

WILKINSON discloses razor blades with a thin layer of chromium of less than 400 Angstrom (40 nm).

In order to approach the claimed invention with respect to the coating thickness, the Examiner took Official Notice that "razor blades are made in variety of shapes, sizes, strengths and

thicknesses for a variety of end uses (e.g. cutting facial hair, utility knives, industrial cutting tools, etc...)”).

However, WILKINSON discloses that the invention relates to razor blades “to impart improved properties to the razor blade by giving enhanced durability to the cutting edge or edges” (Column 1, lines 31-38). There was no suggestion of other uses by WILKINSON.

Moreover, there was no finding of fact to show a coating of a thickness of at least 100 nm in the “variety of end uses”.

OHMI is not able to remedy this shortcoming for reference purposes, as OHMI concerns treating stainless steel by forming passive oxide film at the surface.

Thus, the combination fails to teach the film thickness as recited in claim 3.

iii. Baking at 100°C-200°C with high purity inert gas

The claimed baking step is carried out before heat treatment (page 8, lines 10-17).

WILKINSON subjects the coated razor blades by oxidizing at 400°C in a controlled atmosphere with oxygen. However, there is no baking step.

While OHMI teaches baking at 300-600°C, OHMI teaches baking for removal of moisture from the surface of stainless steel, i.e., an untreated surface, prior to electrolytic

polishing and the formation of the passive oxide film. Thus, at best, OHMI suggests baking the surface of WILKINSON before applying the chromium layer to remove moisture.

The combination fails to suggest baking of a metallic material after a chromium coating which has been plated onto a metallic material, and certainly at the claimed temperature range of 100°C to 200°C.

Therefore, as the proposed combination fails to teach or suggest at least the three features of independent claim 3, the rejection of claim 3 and dependent claims 5 and 6 should be reversed.

2. Claim 7

Claim 7 differs from claim 3 in that the chromium oxide film is defined in terms of element concentration and thickness (i.e., rather than an overall thickness of at least 100 nm as discussed in ii above relative to claim 3). Accordingly, the proposed combination fails to teach or suggest the claimed surface roughness and baking step of claim 7 for the same reasons discussed in items i and ii above relative to claim 3.

The combination further fails to teach or suggest the element concentrations at various depths as recited in claim 7:

- the film has a depth comprising a distance of 100 nm from the outermost surface of the film,
- the film consists of oxygen and chromium,
- the element concentration of oxygen is greater than the element concentration of chromium from the outermost surface to a distance of approximately 30nm in the depth, and
- the element concentration of oxygen is less than said element concentration of chromium at a distance of 100 nm in the depth.

WILKINSON forms a thin layer of chromium of less than 400 Angstrom (40 nm) to razor blades, and subsequently oxidizes this coating to form a chromium oxide film. WILKINSON does specify the elemental concentration, but, at best, discloses conversion "of a substantial portion of the chromium on the cutting edge to chromium oxide". See, e.g., the Abstract.

The Examiner took Official Notice that "razor blades are made in variety of shapes, sizes, strengths and thicknesses for a variety of end uses (e.g. cutting facial hair, utility knives, industrial cutting tools, etc...)". However, regardless of the shape, size, strength or thickness, there fails to be any suggestion for the elemental concentration at any depth relative to the outer surface of the chromium oxide film.

OHMI is not able to remedy this shortcoming of WILKINSON for reference purposes.

OHMI discloses forming a passive oxide film at the surface of the stainless steel, and, consequently, there is an iron content (i.e., discussed in terms of a chromium/iron ratio) that exists at the surface of the passive film. See, e.g., the paragraph bridging columns 3 and 4.

Indeed, in the embodiments disclosed there are various elemental concentrations and film thickness disclosed, but none are the same as those claimed. For example, in embodiment 1 described in claim 6, a passive film having chromium oxide as a chief component was formed, but the film thickness is defined as 2.5nm or greater and the atomic ratio of chromium/iron is 5 or greater. In general, OHMI claims a film having a thickness of 5 nm or more with an atomic ratio of chromium/iron of 1 or more at the outermost layer.

Thus, the combination of WILKINSON and OHMI fails to teach or suggest the claimed element concentration and thickness, in addition the claimed surface roughness and baking step.

Therefore, rejection of claim 7 is improper and should be reversed.

Conclusion

From the foregoing discussion, it is believed to be apparent that the rejections of claims 3 and 5-7 are improper and should be reversed. Such action is accordingly respectfully requested.

Respectfully submitted,

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(viii) **Claims Appendix**

3. A method for manufacturing metallic material having a chromium-oxide passivation film formed thereon, comprising the steps of:

depositing a coating material consisting of chromium by a wet plating method onto a metallic material with a surface roughness (Ra) of not more than 1.5 μ m, said coating material having a thickness of at least 100 nm;

baking said chromium-coated metallic material formed by the wet plating method at a temperature of 100 °C to 200°C in a high-purity inert gas atmosphere; and

applying a heat treatment to said chromium-coated metallic material in an oxidizing atmosphere so as to form a chromium-oxide passivation film on said metallic material, said film having a depth and an outermost surface, and said film providing resistance to highly degradable and corrosive gases.

5. The method according to claim 3, wherein said oxidizing atmosphere comprises oxygen diluted by an inert gas.

6. The method according to claim 3, wherein the highly degradable and corrosive gases are silane, diborane, or phosphine.

7. A method for manufacturing metallic material having a chromium-oxide passivation film formed thereon, comprising the steps of:

depositing a coating material consisting of chromium by a wet plating method onto a metallic material with a surface roughness (Ra) of not more than $1.5\mu\text{m}$ to form a chromium coat film having an outermost surface and a depth comprising a distance of 100 nm from said outermost surface;

baking said chromium coat film formed on said metallic material at a temperature of 100°C to 200°C in a high-purity inert gas atmosphere; and

applying a heat treatment to said chromium coat film formed on said metallic material in an oxidizing atmosphere so that a chromium-oxide passivation film from said outermost surface of said chromium coat film to a distance in said depth, said chromium-oxide passivation film providing resistance to highly degradable and corrosive gases wherein,

said chromium-oxide passivation film consists of an element concentration of oxygen and an element concentration of chromium,

said element concentration of oxygen is greater than said element concentration of chromium from said outermost surface to a distance of approximately 30nm in said depth, and

said element concentration of oxygen is less than said element concentration of chromium at a distance of 100 nm in said depth.

(ix) **Evidence Appendix**

None.

(x) **Related Proceedings Appendix**

None.